DOCUMENT RESUME

ED 143 302 IR 004 745

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TITLE Critical Field Experiments on Uses of Scientific and Technical Information.
INSTITUTION Northwestern Univ., Evanston, Ill. Dept. of Industrial Engineering and Management Sciences.
SPONS AGENCY National Science Foundation, Washington, D.C. Div. of Science Information.
PUB DATE Nov 75
NOTE 24p.; Paper presented at Institute of Management Sciences (Las Vegas, November, 1975)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Computer Oriented Programs; Engineers; *Experiments; Information Seeking; *Information Systems; *Information Utilization; Research Utilization; Scientists; *State of the Art Reviews; *Technical Reports; Technical Writing; Use Studies
IDENTIFIERS *Scientific and Technical Information

ABSTRACT

Research in the field of "information-seeking behavior of scientists and engineers" has been done on the behavior and preferences of researchers with respect to technical literature, computer-based information systems, and other scientific and technical information (STI) systems and services. The objectives of this project are: (1) to review the state-of-the-art in various aspects of the field and to develop researchable questions, and (2) to design (a) some key experiments to be carried out in a large number of organizations and (b) some "administrative experiments" to be carried out by individual managers of research and development (R&D) or STI to solve specific STI problems. Other major sections of the report include: (1) a literature analysis, (2) a survey of STI users, (3) a survey of on-going and proposed experiments by STI users, (4) the development of a propositional inventory, and (5) the exploration of the feasibility of a framework for analysis of the STI process. A list of working papers on the same project are presented. (DAG)

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PROGRAM OF RESEARCH ON THE MANAGEMENT

OF RESEARCH AND DEVELOPMENT

Department of Industrial Engineering and Management Sciences
The Technological Institute
Northwestern University
Evanston, Illinois

CRITICAL FIELD EXPERIMENTS ON USES OF SCIENTIFIC AND TECHNICAL INFORMATION

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November 1975

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ABSTRACT

A large body of empirical data, from survey and field studies, is available on the attitudes, preferences, and behavior of users of scientific and technical information (STI). This body of data has not been used to any great extent by the designers of STI systems and services (STI/SS) or the managers of STI/SS. This paper reports on an NSF supported study aimed at identifying a number of critical experiments that might be carried out within and among organizations which design, manage, and use STI/SS to help improve overall STI effectiveness from the viewpoint of ultimate users.

KEYWORDS

SCIENTIFIC AND TECHNICAL INFORMATION, STI, EXPERIMENTS, USER BEHAVIOR

Work in this area has been supported by a grant from the User Support Program, Office of Science Information Service, National Science Foundation. This paper was prepared for presentation at the Institute of Management Sciences, Las Vegas, November 1975.

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TIMS/Las Vegas Paper
75/51

1. INTRODUCTION

Members of the Program of Research on the Management of Research and Development (POMRAD) in the Department of Industrial Engineering and Management Sciences at Northwestern are developing a series of experimental designs in the field of Scientific and Technical Information (STI). These designs are based on their prior research over two decades and on the growing literature in the field of "information-seeking behavior of scientists and engineers." Much research has been done on the behavior and preferences of researchers with respect to technical literature, computer-based information systems, and other STI systems and services in a general way. The objective of the present project is to pull together the state of the art in various aspects of the field and to design: (1) some key experiments of a general nature that can be carried out in a large number of organizations to contribute further to the state of the art and (2) some "administrative experiments" which can be carried out by individual managers of R&D or STI in their own organizations to solve specific problems of STI.

Field experimentation in organizations is a new art and is beset with many difficulties not faced in an academic laboratory setting, such as those used for most of the "small group" experiments in behavioral science. The pay-off in terms of credible and directly applicable results can be high, however, and the POMRAD group has been doing an increasing number of field experiments in its overall program of studies of the R&D process.

2. OBJECTIVES OF THE PROJECT

(A) Overall Objectives

This is a two-year project (divided into two one-year phases) designed to identify potentially researchable questions and to develop experimental designs as a basis for future research that might be supported by the Office of Science Information Services, consistent with its purposes of 1) gaining an improved understanding of the factors affecting information-seeking, -purchasing, and -using behavior in the area of scientific and technical information (STI) and 2) assessing the technical and economic feasibility of potential STI innovations. The expected audience for the output of this project includes three different groups: researchers on the STI process, designers and managers of STI systems and services (STI/SS), and users of STI/SS (e.g., scientists and engineers).

The objectives of this project relate principally to the following four "Goals to Guide the FY 1975 Program" of the Office of Science Information Service of the National Science Foundation:

1. To measure benefits from information use.
2. To provide guidance for improved management of scientific and technical information (STI) services.

16. To provide guidelines for management of information services within large organizations.
17. To provide guidelines for establishing work conditions that enhance the useful application of information.

The work is divided into seven tasks. The first three, consisting of A) literature analysis, B) selective survey of users of STI user studies (e.g., designers and managers of STI/SS), and C) selective survey of on-going and proposed experiments by STI users, are providing a base for completion of the next two tasks. They are D) development of a propositional inventory and E) exploration of the feasibility of a framework for analysis of the STI process. From these five tasks, and particularly from the base of the propositional inventory, the end product will be developed in the form of F) researchable questions and G) experimental designs.

(B) Objectives of the Individual Phases

Task A - Literature Analysis

Purpose

To draw upon the STI "user behavior" literature selectively to identify researchable questions (Task F) and to help in the preparation of experimental designs (Task G). The analysis of the literature, as the proposal stated, will be prepared in the form of a propositional inventory (Task D) accompanied by a progressive development of a framework for analysis (Task E). Although the general literature search and analysis, as indicated in report No. 4, has continued on a reduced level, specific focused literature searches have been initiated for each of the experimental designs under development. This reverses the earlier process of broad examination of the general "user behavior" literature -- e.g., the annual reviews and other general sources. In the current literature stage, we are seeking specific references related to the variables and propositions involved in individual experimental designs. This stage is expected to continue for the duration of Task G.

Task B - Selective Survey of Users of STI User Studies

Purpose

To obtain by questionnaire and interview from (primarily) "developers and manufacturers of information systems" and "managers of information systems" two somewhat separate inputs to the project. Initially, the input will be in the form of propositions and experiments which they believe would provide "high payoff" results, in terms of usefulness to them. Subsequently, some of these same "users of user studies" will provide information to evaluate the experimental designs.

Task C - Selective Survey of Ongoing and Proposed Experiments by STI Users

Purpose

To obtain, by questionnaire and interview, from selected users of STI information, input on propositions and experiments which could provide solutions to problems which they see as limiting the usefulness of the STI/SS which they use or which are available.

Task D - Propositional Inventory

Purpose

To develop a limited "propositional inventory", which is not a "complete" list of all possible propositions, but a selected list to help generate useful and researchable research questions and experimental designs.

Task E - Framework for Analysis of STI Process

Purpose

1) To examine selected but representative research across a wide variety of disciplines and subject areas; and 2) to determine the feasibility of developing a common or translatable conceptual structure, a framework model for potential use in Tasks F and G, and a process for assessment of research on the STI process. The separate identification of this task is to provide a reference point for identifying and organizing these necessarily supporting activities in the process of carrying out the other tasks.

Task F - Researchable Questions

Purpose

To develop a set of descriptions of potential research projects("studies" as contrasted with "experiments," which are covered in Task G)which might be undertaken by researchers in the field of STI. Descriptions of the research questions will contain references to the state of the art in that sub-area of the overall STI field and a rationale -- that is, the practical and scientific purposes which might be served by undertaking such studies.

Task G - Experimental Designs

Purpose

To develop a set of experimental designs, together with references to supporting methodology.

3. SOME PRELIMINARY EXPERIMENTAL DESIGNS

In this section, a preview is given of several experimental designs which are currently being developed as part of Task G, one of the final outputs of the project. Figures 1-3 relate to the first of these -- the "accessibility-quality" experiment (or set of experiments). However, Figure 2 is a generalized model, starting with the first node on the left and is relevant to all of the other experiments being developed.

A) 1) Short Title:

Accessibility vs. Quality of STI Sources*

2) Full Title:

Frequency of use and preference for STI sources and channels, as a function of perceived and actual:accessibility, ease of use, potential value, and quality.

3) Brief Statement of the Problem:

Users of STI typically have multiple sources and channels for the information they seek and use. Some of these sources and channels are routinely available to the user---e.g., journals that come to his desk; his organization's library; colleagues that are nearby and willing to provide information; handbooks on his shelf; current awareness systems that deliver abstracts, references, or documents to him periodically; etc.

Much of the information received in such routine manner is convenient to acquire as well as useful in his work.

However, a number of studies conducted at Northwestern and elsewhere indicate that the search behavior of many users is rather restricted and often ends in: (a) the acquisition of information that does not entirely satisfy the user's needs or, (b) fails to satisfy the needs at all. Further,casual observation (as opposed to rigorous studies) as well as our own direct experiences suggest that the outcome of deliberate searches and passive receipt of "current awareness" information frequently falls short of providing the "best" or even "very good" results.

Many factors enter into this situation, including: inadequate training of users in the information-search process, economic and other constraints on searching for and obtaining high quality and highly useful information, personal characteristics of the user, time constraints, and the nature of the task and the field for which the information is sought.

Some of these factors are beyond the immediate influence of the designer or manager of STI systems or services (STI/SS). Others, however, are clearly controllable and subject to improvement and adaptation to user needs. Among these are factors such as: the design of particular STI/SS for accessibility and ease of use, resources levels available for using better or best STI/SS for particular purposes, administrative procedures for using them, and general support for the users who are attempting to find and use the best available information.

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* Specific terms such as "sources", "channels", "accessibility", "quality", etc., are defined in the complete experimental package of this experiment.

This experimental design is aimed at identifying and helping the user, the designer, and the manager of STI/SS to overcome barriers to using the best available sources and channels for STI.

4) Brief Summary of the Experiment:

The full experimental package gives the overall design of the experiment which must , be detailed and adapted to the specific circumstances of the organization(s) in which it is to be carried out. In this introductory statement, we give an overview of the structure of the experiment:

(1) What does the experimenter or administrator want to change or improve:

These are wha are called, in the design, the "dependent" variables. These are factors describing the behavior and attitudes of STI users which have the potential for improving their performance as researchers or other participants in the R&D/ Innovation process and their impact on the overall process.

(2) What can the experimenter or the administrator do to accomplish such changes or improvements:

These are what are called, in the design, the "independent" variables or the "experimental" variables. These are factors over which the experimenter or administrator has some control and which may be changed or manipulated within the specific situation or organization. A number of these manipulable factors are given in the experimental package; they include:

- Budget allocations
- Access characteristics of sources
- Organizational location
- Access and use procedures
- Training of users and intermediaries
- Interface mechanisms (intermediaries, etc.)
- Quality characteristics of sources (in some cases)

(3) What conditions must the experimenter or administrator take as given or fixed for the purposes of this experiment:

These are factors in the organizational, economic, technical, and other environments of the STI situation being examined which are outside the immediate control of the experimenter or administrator. As Figure 1 suggests, however, some of these "parameters", such as those indicated by asterisks, may be subject to potential experimental or administrative manipulation within the STI situation. Or they may vary naturally over a range of STI situations and thus serve as "natural experimental or independent variables," along with those we have designated as independent variables.

The distinction between independent variables, -"2", above- and parameters -"3" above - is not always clear. Individual administrators differ with

respect to their power in the organization, the resources available to them, their time perspectives, and their willingness to try to change things. Therefore, one experimenter or administrator's "parameter" may be another's "experimental variable." The particular independent variables selected for this experiment arose out of our assessment of their centrality and potential impact on the outcomes of both the STI and the overall R&D/Innovation process.

Finally, Figure 3 suggests the complexity of the relationship between these few factors we have selected for this particular experiment (other experimental designs in this series deal with additional ones) and downstream outcomes of the overall R&D/Innovation process.

In summary of these introductory comments, we may say that the perceived and actual characteristics of STI sources can have significant impacts on the behavior of users, the outcomes of their scientific and technical efforts, and the contribution of the R&D/Innovation process in which they work to important soci-economic goals.

It is, therefore, worth trying to improve the "front end" of the process by experimenting with improved accessibility, ease of use and quality of STI sources.

FIGURE 1: MAJOR VARIABLES OF THE ACCESSIBILITY-QUALITY EXPERIMENT

Independent Variables (Perceived and Actual)

* Perceived Accessibility of Source
* Perceived Quality of Source
* Perceived Ease of Use
* Perceived Potential Value

Dependent Variables

Frequency of use of source

Preference for STI sources

Steps in search behavior

Satisfaction of specific search objectives

Satisfaction of STI needs

Quality of outcome of search

Quality of STI provided.

Parameters

* Training of users of STI/SS

Economic constraints

Organizational constraints

Time constraints

Personal characteristics of users

Nature of the specific task

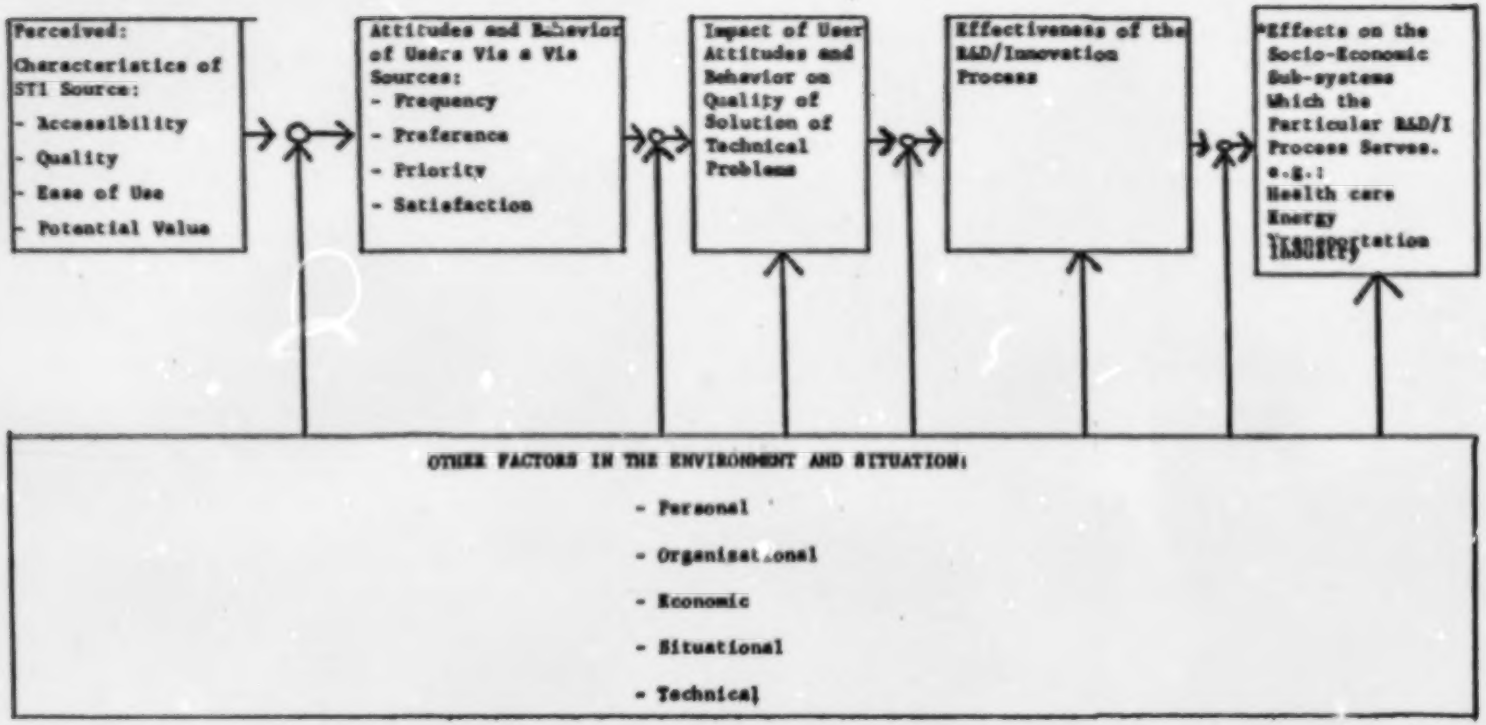
Nature of the field of work

* Interface mechanisms
* Administrative procedures for use of a source
* "Actual" quality, accessibility, ease of use and value of a source

* Subject to potential experimental or administrative manipulation within the STI situation.

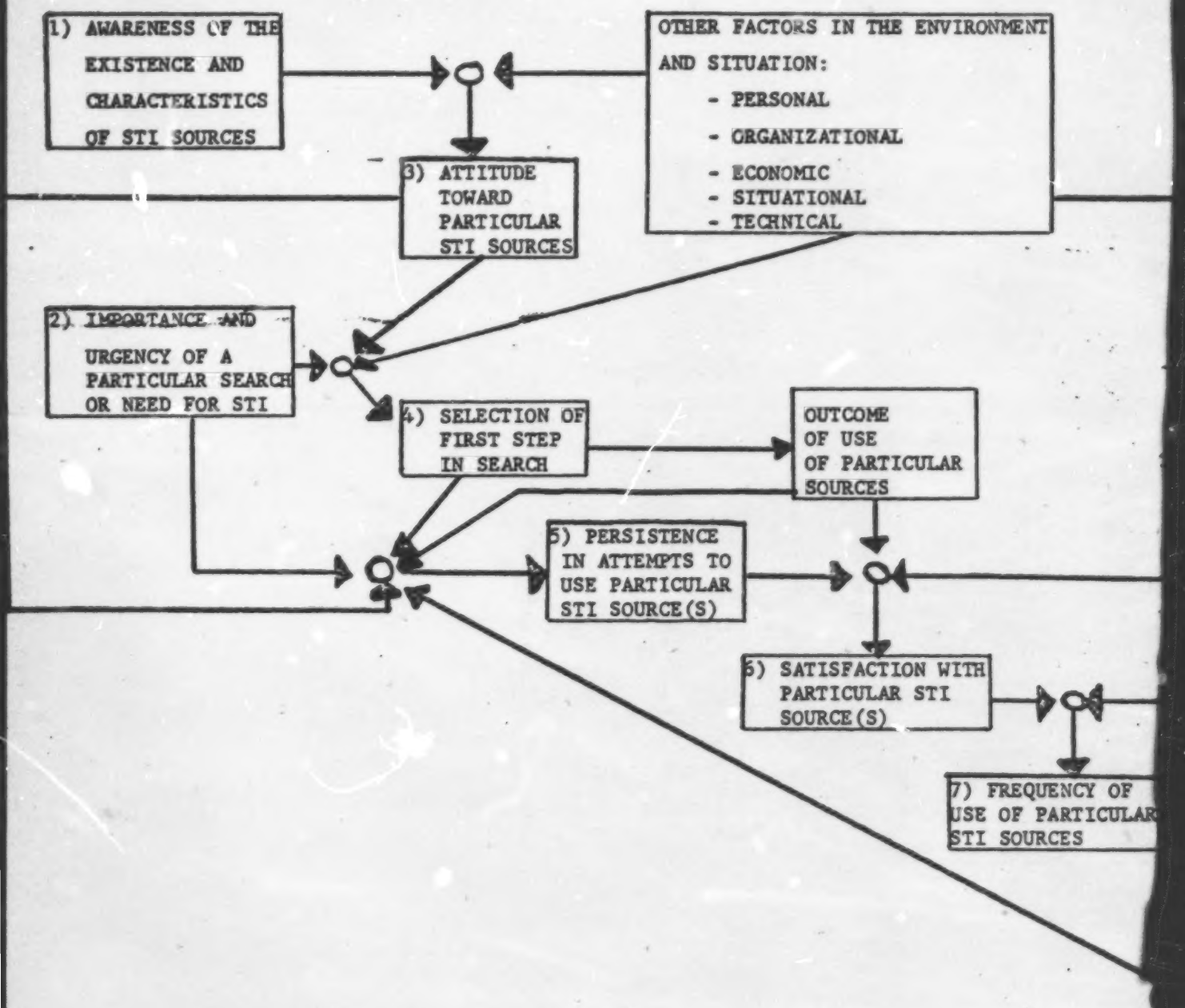
FIGURE 2: ABBREVIATED MODEL OF THE RELATIONSHIPS OF THE VARIABLES IN THE EXPERIMENT TO THE OVERALL R&D/INNOVATION PROCESS

(Illustrative and not Definitive)



* We have been doing work on this area of the connection between Science Indicators and Social and Economic Indicators over the past year. Some references are the progress reports on "Exploration of Output Indicators for R&D" by Albert H. Rubenstein and Eliezer Geisler, Northwestern University, Document Numbers 75/64, 75/84, 75/96, and 75/99.

FIGURE 3: FLOW MODEL OF THE VARIOUS STAGES IN THE STI PROCESS REFLECTED IN THE ACCESSIBILITY-QUALITY EXPERIMENT


1) AWARENESS OF THE EXISTENCE AND CHARACTERISTICS OF STI SOURCES
OTHER FACTORS IN THE ENVIRONMENT AND SITUATION:
- PERSONAL
- ORGANIZATIONAL
- ECONOMIC
- SITUATIONAL
- TECHNICAL
3) ATTITUDE TOWARD PARTICULAR STI SOURCES
2) IMPORTANCE AND URGENCY OF A PARTICULAR SEARCH OR NEED FOR STI
4) SELECTION OF FIRST STEP IN SEARCH
OUTCOME OF USE OF PARTICULAR SOURCES
5) PERSISTENCE IN ATTEMPTS TO USE PARTICULAR STI SOURCE(S)
6) SATISFACTION WITH PARTICULAR STI SOURCE(S)
7) FREQUENCY OF USE OF PARTICULAR STI SOURCES

B) (1) Short Title:

Person-to-person communication

(2) Full Title:

Effect on amount and kind of person-to-person communication of management policies and procedures.

(3) Brief Statement of the Problem:

While much of the concern with improving the process through which STI is made available to, or is obtained by, the individual end user is directed to information in hardcopy format (e.g., journals, books, reports, etc.), and, to some extent, in non-hardcopy media (e.g., video and audio recordings, computer displays, etc.), it would appear clear from both conventional wisdom and from the results of many user studies that a significant part of the process occurs through direct transfer of information from one person to another.

Studies of the "face-to-face" process range over a variety of disciplines and problems: user studies of information sources, channels and information-related behavior; experiments and studies on small group decision processes; studies of individual creativity and of task performance; case studies of particular forms, such as conferences, committee meetings, and audio and video communication links; and others. Much is known about the face-to-face process, but it is not readily available in a convenient and usable form to the individual who is concerned with improving the process i.e., the designer or manager of STI Systems and Services (STI/SS).

There are a variety of factors which affect the process. At the most basic level these include the existence of a sender and receiver, their awareness of one another, and the ability and willingness to communicate. In a more detailed sense, factors include the following: physical capability to communicate (co-location in space and time, a dedicated bi-directional communication link and some acceptable level of signal-to-noise ratio); some body of credible and/or useful or relevant STI information; relative availability of time necessary for communication; sender (and receiver) perception that communication is compatible with their individual (and, by extension, organizational) reward and punishment structures; and the like. In specific situations, another considerably larger set of factors arise, including

the following: personal preferences or aversion to conversation, use of telephone, participation in multi-person activities, etc.; perception of the "attractiveness" or "threat" associated with contact with a particular other person; expectation that the other person is able and willing to provide the needed information, or accept and use it; etc.

Some of these factors, at least in specific situations, are beyond the control of the individual user, the designers and managers of STI/SS, or R&D managers. Others, however, are subject to control, such as: availability of telephones, conference rooms, private offices, opportunities to travel; perceptions that communications are encouraged, etc.

4) Brief Summary of the Experiment(s):

There are a number of experiments, and supporting or preparatory studies, which may be carried out for such purposes as: 1) to achieve some desired change or result in terms of the amount or kind of person-to-person communication, 2) to confirm that a particular intervention (change in policy or procedure) will bring about the predicted (desired) change in a specific situation, or 3) to establish the range of interventions over which desired changes can be made effectively. While there are a number of ways in which one could present a set of experiments, it is proposed, for convenience to group them into several broad categories, as follows:

(1) How does the experimenter/administrator design and carry out an experiment: These phases can be identified: 1) choosing and defining the problem, the intervention or desired change, and the parameters, 2) developing the form of the experiment, and 3) carrying it out. They can be presented in a series of illustrative designs. These experimental designs are proposed to include the following: a) changing management policies on rewarding individual achievement to reduce the "not-invented-here" syndrome; b) changing travel and telephone policies to increase (or decrease) face-to-face communication; c) changing facilities available to project groups to increase (or decrease) face-to-face communication.

(2) How can the experimenter/administrator identify the choices he may have in terms of changes he can make or changes he can achieve: An extensive and comprehensive checklist will be presented in the full experimental package. Interventions

will include, for example: physical changes in facilities; budgetary changes; selection of personnel; changes in promotion and disciplinary policy; changes in procedures for communication. Potentially desired changes will include: changes in the kinds of communication; changes in the amount of communication; changes in the timing; changes in the participants.

(3) How can the experimenter/administrator determine the relationship between face-to-face communication and other variables he is interested in: The decision to obtain some desired change in the amount or kind of face-to-face communication may depend upon how that change affects some other desired result. The kinds of experimental questions to be covered here include: a) the need or value as a function of the relative scientific rank of the sender and receiver; b) the need or value as a function of the scientific discipline; c) the need or value as a function of the task or phase of the task.

4) How can the experimenter/administrator determine the need to make a change, i.e., how is he doing now: This may include a "study" as distinguished from an experiment, but may be a necessary first step in some circumstances. The kinds of questions here include: a) what are the organization's present policies and procedures, not only as formally stated or known to the administrator but also as actually carried out in practice and as perceived by the individual scientist or engineer; b) what is the present amount and kind of face-to-face communication, particularly in specific situations of interest; c) what is the present level of efficiency or effectiveness of particular parts of the R&D process of interest.

C) (1) Short Title:

Group Cohesiveness

(2) Full Title:

The role of group cohesiveness in the adoption and utilization of STI.

(3) Brief Statement of the Problem:

There is a considerable amount of work describing the effects of the level of group cohesiveness on the willingness of group members to adopt various innovations (see Havelock, 1971), but there have been relatively few attempts to extend or test, in actual field or natural experiments, the hypotheses derived either from laboratory experiments or field surveys.

Seashore (1954), for example, found that industrial work groups would lower or raise their productivity on the basis of the groups' cohesiveness and the group members' conformity to certain norms. The results that Seashore obtained in the field are similar to the laboratory findings of Schachter et al. (1951). Other attempts to extend in field situations the explanatory and predictive power of the concept of group cohesiveness have been largely confined to studies of industrial workers and managers. Menzel (1956) studied physicians and obtained, via the field survey method, data on the relationships among group cohesiveness, professional acceptance, and a physician's willingness to innovate that were very similar to the laboratory findings of Dittes and Kelley (1956). Pelz and Andrews (1966), using survey and cross-sectional comparison methods, reported positive relationships among a scientific group's level of cohesiveness, their frequency of both intergroup and intragroup communication, and their level of creative performance. Given the wealth of survey results on this subject, and the relevant findings of laboratory experimentation, and in light of the importance attached to group cohesiveness in the workings of the scientific community (Hagstrom, 1965; Crane, 1972; Griffith and Mullins, 1972), it seems most important that these survey and laboratory results be extended and applied in the framework of actual field experimentation.

A number of studies (March and Simon, 1958; Cyert and March, 1963) have pointed out that the structure of a work group (centralized versus decentralized, project-oriented versus function-oriented) has a definite effect on the flow of information within the group and between the group and other organizations. As was previously noted, one aspect of group structure--the degree of cohesiveness-- has been reported by Pelz and Andrews (1966) to have a positive effect on the flow of new information into

a group, which in turn tends to increase the quality of the group's performance. Highly cohesive groups seem to manage more efficiently the flow of new information into the group than do less structured groups, and they also seem to come to agreement concerning the use of the new information more quickly than groups with a low level of cohesiveness.

Cartwright (1968) has provided a theoretical explanation for this difference. He remarks that "those who are highly attracted to a group more often take on responsibilities for the group, participate more readily in meetings, persist longer in working toward difficult goals, attend meetings more faithfully, and remain members longer. Furthermore, members of a cohesive group are more willing to influence other members and in turn are more willing to listen to other members' views and to be swayed by their opinions."

If we conceive of an individual's willingness to adopt a new method of seeking information as in part a function of the success of his group at influencing his choices, it becomes clear that group cohesiveness should be one of the determinants of both individual and group willingness to adopt a new information system. Whether cohesiveness will be a positive or negative influence, however, is determined largely by the direction of group induction. If the group attempts to influence its members to adopt the new system, groups defined as high in cohesiveness should adopt the system to a greater extent than groups defined as low in cohesiveness. If the group attitude toward the system is negative, then highly cohesive groups should show a lower rate of individual use than moderate or low cohesive groups. In both cases, the more cohesive groups should be more successful at influencing their members.

4) Brief Summary of the Experiment(s):

The conditions of field experimentation constrain a researcher from applying many, if not all, of the themes and variations common to laboratory experimentation in the area of group cohesiveness. A field researcher cannot "create" groups by random assignment. Nor can he, by use of some instruction, manipulation, or ruse, "create variations" in the cohesiveness of groups.

What the field experimenter can do, however, is to find existing groups organized around some central task, and to find variations in cohesiveness naturally occurring

within the groups. This requires a period of preparatory study and exploration. It requires also the development of new or the application of existing instrumentation designed to measure variations in the level of group cohesiveness. Once having identified work groups which are similar in important respects, but which vary in cohesiveness a field experimenter may perform any number of interventions or measurements aimed toward establishing the relationship between group cohesiveness and the adoption, diffusion, and utilization of STI.

While there are a variety of ways in which these experiments might be outlined, what is presented here is simply an overview of the elements of the experiments.

(1) What does the experimenter or administrator want to change or improve: These are listed in Figure 4 as the dependent variables.

(2) What can the experimenter or administrator do to accomplish such changes or improvements: These are listed in Figure 4 as the independent or the experimental variables.

(3) What conditions must the experimenter or administrator take as given or fixed for purposes of the experiments: These are the parameters of the experiments. They are factors or conditions in the organizational, economic or technical environment which are considered to be outside of the control of the administrator or experimenter. Control in this strict sense of the word means that it is beyond the power of the administrator-experimenter to vary or to alter these factors. In quite another sense of the word the experimenter can "control" these factors by accounting for them in any comparisons. That is when an experimenter says that he "controls" for eg., age, sex or seniority he means that he recognizes the interaction of these parameters with his independent variables. As pointed out in a previous design "one man's parameter may be another man's experimental variable," but quite often all men's parameters may be treated as variables in interaction with the independent variables of the experiment. In some instances parameters are treated as "fixed" as oppoed to "random" variables.

FIGURE 4: SOME MAJOR VARIABLES OF THE GROUP COHESIVENESS EXPERIMENT

Independent Variables (Perceived and Measured)	Dependent Variables
Perceived Level of Cohesiveness	Satisfaction (Current STI)
Measured Level of Cohesiveness	Productivity
	Adoption of New STI (Attitudinal Measure)
	Adoption of New STI (Behavioral Measure)
	Use of New STI (Attitudinal Measure)
Parameters:	Use of New STI (Behavioral Measure)
Research Sites	
Organizational Characteristics	Use of STI (Individual Measure)
Group History	
Group Seniority	Use of STI (Within Group Measure)
Personal Characteristics of Group Members	
Nature of the Group Task	Use of STI (Second Order: pass along measure)

4. CUMULATIVE LIST OF WORKING PAPERS AND MEMORANDA ON PROJECT

Items marked "L" are limited to internal use by members of the project staff and are not intended for wider distribution. The number preceding each item is the POMRAD (Program of Research on the Management of Research and Development) document number.

		TASK*
74/11	Albert H. Rubenstein, "Pilot Version of Letter-Survey on Trends in Scientific Information Systems and Services (STI/SS), Sent to Industrial R&D Executives," May, 1974.	C
74/51	Albert H. Rubenstein, Memo to Members of STI/NSF Project (4/29/74) on Initial Detailing of Tasks A, D, and F of the Project. (L)	A,D,F,
74/58 Rev.	Robert Rifkin, Jinjoo Lee, "Development/Adoption of Indexing Terms for STI/NSF Project," Aug., 1974.	A,E
74/67	Albert H. Rubenstein, Memo to Charles W. N. Thompson and Robert D. O'Keefe (6/5/74) on Data on the Use of User Studies. (L)	B
74/72	Robert D. O'Keefe, Albert H. Rubenstein, Memo to Joel Goldhar: "Some Comments on User Satisfaction with STI and User Awareness of the Content of STI/SS," June, 1974.	C
74/78	Robert Rifkin, Jinjoo Lee, "Propositions on Information Needs and Use Extracted from Annual Reviews of Information Science and Technology," July, 1974.	D
74/80	James Freeman, Albert H. Rubenstein, The Users and Uses of Scientific and Technical Information: Critical Research Needs, Aug., 1974. Denver Research Institute.	F
74/81	First Quarterly Progress Report to User Support Program, OSIS, NSF, on Researchable Questions and Experimental Designs on the STI Process. July, 1974.	
74/82	Albert H. Rubenstein, Memo to Charles W. N. Thompson and Robert D. O'Keefe (7/11/74), Ref. 74/78: Propositions on Information Needs and Uses Extracted from Annual Reviews of Information Science and Technology--A Possible Instrument.	D

*Principal Task to which document is related, although some are related to several tasks.

		TASK*
74/85	Charles W. N. Thompson, Memo to Members of STI/NSF Project (7/2/74) on Initial Detailing of Task B of the Project. (L)	B
74/91	Richard Herman, "Propositions Extracted from the Scientific and Technical Literature for STI/NSF Tasks B and C," July, 1974.	D
74/95 Rev. 11/27/74	Richard Herman, "Report of a Survey Conducted on the Characteristics of the Third-Class Mail Received by a Senior Academic Researcher," Nov., 1974.	C
74/102	Charles W. N. Thompson, Memo to STI/NSF Group (8/5/74) on Format (preliminary) for Tasks F and G Candidates. (L)	F,G
74/103	Charles W. N. Thompson, Memo to STI/NSF Group (8/5/74): "Cooperation Among Intra-Organization STI Intermediaries" (Candidate Proposition for Task F). (L)	F
74/104	Charles W. N. Thompson, Memo to STI/NSF Group (8/5/74) on Candidate Propositions and Experiments (Task G). (L)	F,G
74/105	Charles W. N. Thompson, Memo to STI/NSF Group (8/5/74): "Inter-STI/SS Cooperation on Mailing Lists" (Candidate Proposition for Task F). (L)	F
74/106	~~Jinjoo Lee, "Propositions from~~ ASLIB Proceedings, Vol. 23, No. 1, Jan., 1971, D. N. Wood Review of Literature on User Studies 1966 to 1970," Aug., 1974.	D
74/107	Jinjoo Lee, Memo to STI/NSF Group (8/8/74) on STI/NSF Subproject "New Items." (L)	B
74/108	Robert Rifkin, Memo to Albert H. Rubenstein, Robert D. O'Keefe, and Jinjoo Lee (8/16/74) on STI Index. (L)	A
74/109	Richard Herman, "Protocol for Task B Interview for the STI/NSF Project," Aug., 1974.	B
74/111	Richard Herman, "Task C Questions," Aug., 1974. (L)	C
74/113	Second Quarterly Progress Report to User Support Program, OSIS, NSF, on Researchable Questions and Experimental Designs on the STI Process. Oct., 1974.	
74/114	Jinjoo Lee, Memo to STI/NSF Group (9/13/74) on STI/NSF Subproject "New Items."(L)	B
74/121	Albert H. Rubenstein, "Idea for a Research Design or an Administrative Experiment on Marketing of Scientific and Technical Information in Developing Countries," Nov., 1974.	G

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75/1 Jinjoo Lee, Albert H. Rubenstein, "Design and Orientation/ Training for Uses of Personalized STI Systems," Jan., 1975. G

75/2 Jaime Silva, "Administrative Experimentation in a Transportation Agency," Aug., 1974. C

75/3 Richard Herman, "Summary of the Responses Obtained to the Pilot Mailing of a Questionnaire to Information Systems Managers in Order to Generate Research Ideas," Jan., 1975. B

75/13 Warren Frederick, "Criteria for Evaluating Research Output," Feb., 1975. (L) F

75/14 Jinjoo Lee, "Summary Report on Subproject 'New Items'," Jan., 1975. B

75/15 Albert H. Rubenstein, Jinjoo Lee, "Analysis of the Results of a Mini-Survey of Directors of Industrial Research on the Importance of STI for the R&D Process," Dec., 1974. C

75/16 Jinjoo Lee, Instrument for "New Items" Subtask, Nov., 1974.(L) B

75/17 Jinjoo Lee, "Proposition Candidates from Annual Reviews of Information Science and Technology, Vols. 1, 3, and 5," July, 1974. D

75/18 Warren Frederick, "Candidate Proposition: Technical Gatekeepers," Nov., 1974. (L) D

75/19 Albert H. Rubenstein, "Ranking of Significance and Researchability of Questions from Doc. No. 121 (STI in LDCs)," Dec., 1974. (L) F

75/20 Richard Herman, "Conversion of an Organization's STI Filing System from Hardcopy to Microform," Dec., 1974. (L) F

75/21 Robert D. O'Keefe, Warren Frederick, "An Experimental Study of Formalization of the Key Communicator Role in a Teaching Hospital Setting," Jan., 1975. G

75/22 Charles W. N. Thompson, Richard Herman, "Draft of Experimental Design Dealing with the Sharing of Mailing Lists Between Scientific and Technical Journals," Jan., 1975. G

75/23 Evelyn A. Moore, "Determining the Costs of Using On-Line Information Retrieval Systems: A Preliminary Note," Jan., 1975. (L) B

75/24 David Birr, "Some Criteria for the Evaluation of Models of Information Systems," Dec., 1974. (L) E

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		TASK*
75/26	Jean Gagan, Rough Draft of Possible Candidate Propositions to 1/30/75. (L)	D
75/27	Richard W. Trueswell, "User and Manager Perceptions in R&D Organizations Regarding Research on STI/SS," March, 1975. (L)	C
75/28	Robert D. O'Keefe, "Research Question: Relationship Between Frequency of Use and Importance of Source," Nov., 1974. (L)	F
75/29	Charles W. N. Thompson, Memo to STI/NSF Group (1/8/75) on Potential Task F Propositions and Task G Experiments from DRI "Critical Research Needs." (L)	F,G
75/30	Charles W. N. Thompson, Memo to STI/NSF Group (1/16/75) on Potential STI Proposition on Facilitative Support for Various Nonformal Groups. (L)	D
75/31	Charles W. N. Thompson, "Management Practices to Encourage Information Use: Researchable Questions," Feb., 1975. (L)	F
75/32	Warren Frederick, Memo to STI/NSF Group (2/13/75) on Evaluating Gatekeepers. (L)	G
75/35	Jinjoo Lee, Memo to STI/NSF Group (10/28/74) on Individual STI Systems of Highly Productive Scientists and Engineers.	F
75/36	Jinjoo Lee, Memo to STI/NSF Group (10/29/74) on Orientation Program for STI Systems. (L)	G
75/55	Albert H. Rubenstein. Letter regarding the importance of experiments to understanding STI user behavior. (L)	G
75/56	Albert H. Rubenstein, "Possibilities of Improving R&D Creativity Through In-House Experimentation,", April, 1975	G
75/66	Albert H. Rubenstein, "Technical Information, Technical Assistance, and Technology Transfer--the Need for a Synthesis," June, 1975. (Paper presented at UN/ECE Conf., Geneva, July 14-16, 1975).	General
75/78	David M. Birr, "Codebook Logic Draft," August, 1975. (L)	D
75/79	Kenneth C. Kirsch, Robert D. O'Keefe, "Organizational Climate and Gatekeepers," July, 1975 (L)	G
75/80 Rev. 9/8/75	Kenneth C. Kirsch, Robert D. O'Keefe, "Audiovisual Equipment Design," Sept., 1975 (L)	G
75/81	Jean F. Gagan, Memo to STI/NSF Group (7/14/75) List of propositions considered by STI/NSF Project Group through July, 1975.	D
75/82	Kenneth C. Kirsch, Robert D. O'Keefe, "Selective Journal-Initiated Reprint System," July, 1975. (L)	G
75/101	A. H. Rubenstein and David Birr. Draft of Experimental Design Package on "Accessibility-Feasibility"Experiment, NOV., 1975	G